NEW RICHMOND

# **CITY UTILITIES**

Electric • Water • Sewer

18 50 -2 A 9 51

January 23, 2001

Mr. Jim Loock, Chief Electric Engineer **Public Service Commission** 610 N. Whitney Way P.O. Box 7854 Madison, WI 53707-7854

RE: In the Matter of Filing Reporting Requirements for Appropriate Inspection and Maintenance, PSC Rule 113.0607(6)

Dear Mr. Loock:

Enclosed for filing are 3 copies of New Richmond City Utility's report to the commission, submitted every two years, showing compliance with its Preventative Maintenance Plan.

Very truly yours,

Dennis Horner Utility Manager

**Enclosures 3** 

kr

RECEIVED

FEB 0 2 2001

**Electric Division** 

# PREVENTATIVE MAINTENANCE PLAN

# **NEW RICHMOND CITY UTILITIES**

FILING DEADLINE FEBRUARY 1, 2001

January 23, 2001

Dennis Horner
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FEB 0 2 2001

**Electric Division** 

This plan was prepared by the MEUW work group for PSC Rule 113.0607 for use by the 82 municipal electric utilities in Wisconsin and endorsed by PSC staff as meeting the requirements of Rule PSC 113.0607.

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### I. Preventative Maintenance Plan

The PSC 113.0607 rule reads;

Appropriate inspection and maintenance: system reliability.

- (1) PREVENTATIVE MAINTENANCE PLAN. Each utility or other person subject to this chapter, including persons who own electric generating facilities in this state who provide service to utilities with contracts of five years or more, shall develop and have in place its own preventative maintenance plan. This section is applicable to electric generating facilities as set forth at s. 194.491(5)(a)(1), Stats. Each plan shall include, among other things, appropriate inspection, maintenance and replacement cycles where applicable for overhead and underground distribution plant, transmission, generation<sup>1</sup>, and substation facilities.
- (2) CONTENTS OF THE PLAN. (a) *Performance standard*. The Preventative Maintenance Plan shall be designed to ensure high quality, safe, and reliable service, considering: cost, geography, weather, applicable codes, national electric industry practices, sound engineering judgment and experience.
- 1 PSC staff interpretation is that generation applies to individual generators equal to or greater than 50 MW.

### II. Inspection Schedule and Methods:

The purpose of this plan is to maintain or improve the electrical system reliability with the objective of increased municipal loyalty and satisfaction from our constituents. The goals are to meet and exceed the schedules established in this plan.

Exception reporting (inspected equipment not in good condition) will be the method of documentation on all inspection forms.

The scope of this plan is traditional and uses proven maintenance techniques. Unique operating and maintenance philosophies have not been considered. Also, manufacturer defects will be dealt with as they are communicated to this utility.

### **EVERY**

| SCHEDULE:                      | MONTHLY | ANNUAL | 5 YEARS |
|--------------------------------|---------|--------|---------|
| Transmission (≥69Kv and above) |         | X      | X       |
| Substations                    | X       | X      |         |
| Distribution (OH & UG)         |         |        | X       |

The inspection of Distribution facilities will be by individual substation circuits on a 5-year cycle such that the entire system will be inspected every 5 years. Inspector instructions for inspecting all facilities and forms are included with the plan.

METHODS: Five criteria groups will be used to complete the inspection of all facilities.

- 1. <u>IR</u> infrared thermography used to find poor electrical connections and/or oil flow problems in equipment.
- 2. <u>RFI</u> Radio Frequency Interference, a byproduct of loose hardware and connections, is checked using an AM radio receiver.
- 3. <u>SI</u> structural integrity of all supporting hardware including poles, crossarms, insulators, structures, bases, foundations, buildings, etc.
- 4. <u>Clearance</u> refers to proper spacing of conductors from objects, trees and other utility cables.
- 5. <u>EC</u> equipment condition on non-structural components such as circuit breakers, transformers, regulators, reclosers, relays, batteries, capacitors, etc.

### III. Condition Rating Criteria:

This criterion, as listed below, establishes the condition of a facility and also determines the repair schedule to correct deficiencies.

- 0) Good condition
- 1) Good condition but aging
- 2) Non-critical maintenance required normally repair within 12 months
- 3) Priority maintenance required normally repair within 90 days
- 4) Urgent maintenance required report immediately to the utility and repair normally within 1 week

### IV. Corrective Action Schedule

The rating criteria as listed above determine the corrective action schedule.

### V. Record Keeping

All inspection forms and records will be retained for a minimum of 10 years. The inspection form contains all of the required critical information i.e. inspection dates, condition rating, schedule for repair and date of repair completion.

### VI. Reporting Requirements

A report and summary of this plan's progress will be submitted every two years with the first report due to the Commission by February 1, 2003. The report will consist of a letter documenting the percent of inspections achieved compared to the schedule and a description of maintenance achieved within the scheduled time allowance.

### VII DISTRIBUTION - OVERHEAD INSPECTION GUIDE

### STRUCTURE

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires
- U Guard/Conduit Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
- Capacitors
  - ✓ Fuses Blown
  - ✓ Bushing Condition
  - ✓ Oil Leaks
  - ✓ Tank Bulged
  - ✓ Switches, Oil, Vacuum
  - ✓ Control Conduit/Wiring
  - ✓ Grounding/Bonding
- Switches GOAB, Inline, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Cutouts
  - ✓ Insulator Condition
  - ✓ Fuse Size Tag

### VII DISTRIBUTION - OVERHEAD INSPECTION GUIDE (con't)

### EQUIPMENT (CON'T)

- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections
  - ✓ Ground Lead Disconnection
- Cable Terminators
  - ✓ Insulator Condition
  - √ Grounding/Bonding

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Swimming Pool, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Transmission Lines
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

### INFRARED SCAN

- Main Three-Phase Feeders
- Priority Overhead Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating
- Current & Voltage Transformers if Applicable

### RFI CHECK

OH system with AM radio as each circuit is inspected

| _                                   |           |                 |   |             | <del></del> |  |  | Т  |              | 1            |  |  |  |  | T  | $\neg \neg$                                      | T  |  |  |
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| ļ                                   |           |                 | Corrected By  |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
| Ckt                                 |           | p               | Date Item Correcte  |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
| Inspected bySub                     | COMMENTS  | Rating Criteria | 0) Good Condition 1) Good Condition but aging 2) Non-critical Maintenance Required 3) Priority Maintenance Required 4) Urgent Maintenace Required |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
| Inspe                               | :         |                 | 9<br>5<br>6<br>6<br>7<br>8<br>7   |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
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|                                     | Ş         | ske             | Streets, Roads, Alle  |             |             |  |  |  |              |              |  |  |  |  |  |  |  | ļ  |  |
|                                     | R<br>A    | S               | Building Clearances   |             |             |  |  |  |              | <u> </u>     | <u> </u>   |  |  |  |  |  | Ĺ  |  |  |
| اله                                 | CLEARANCE | səbu            | Ground Line Cleara  |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  | · .  |
| Date_                               | ರ         |                 | Tree Trimming   |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
| _                                   |           |                 | Street Light  |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
|                                     | F         | <b></b>         | Terminators   | 1           |             | 1  |  |  |              |              |  |  |  |  |  |  |  |  |  |
|                                     | Æ         | <b></b>         | Arresters   | <del></del> |             | ļ  |  |  |              |              | <b>†</b>   |  |  |  |  |  |  |  |  |
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| _                                   | EQUIPMENT |                 | Switches  | +           |             | T  | <del>                                     </del> | <b>†</b>   | ļ            | 1            |  |  |  |  |  |  |  |  |  |
| ORM                                 | ш         | <u> </u>        | Transformer   |             |             | <del> </del>                                     | $\vdash$   | <del>                                     </del> | <u> </u>     | <u> </u>     |  |  |  |  |  |  |  |  |  |
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| ഥ                                   |           | PUC             | J'Guard/Conduit Co<br>7FI Check   |             |             | <del>                                     </del> | <del> </del>                                     | <del> </del>                                     | <del> </del> | $\vdash$     | <del>                                     </del> |  | <del>                                     </del> | <del> </del>                                     | <b></b>  |  | <b>-</b>   |  |  |
| $\sim$                              |           |                 | Conductor and Ties  | +           |             | <del> </del>                                     | +  | <del>                                     </del> |              | +            | <del> </del>                                     |  | <del> </del>                                     | <del>                                     </del> |  |  |  |  |  |
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| 30                                  |           | <u></u>         | nsulators, DE, Pin<br>Soil Conditions   |             |             | +  | +  | 1-   | 1-           | <del> </del> | +  | -  | <del>                                     </del> | +  |  |  | $t^{-}$  | <del>                                     </del> |  |
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| OVERHEAD DISTRIBUTION INSPECTION FO | MAP AREA  |                 | NOTE  |             |             |  |  |  |              |              |  |  |  |  |  |  |  |  |  |
| б                                   |           | 1               | ***************************************   |             | <u> </u>    | 1  |  | <u> </u>   |              | 1            |  | <u> </u>   | <u></u>  | <u> </u>   | 1  | <u> </u>   | <u></u>  |  | 1  |

### VIII DISTRIBUTION - UNDERGROUND INSPECTION GUIDE

# STRUCTURAL (Exterior & Interior) Transformer, Primary Pedestal, Secondary Pedestal, Switchgear.

- Enclosure Condition
- Level/Leaning
- Security
- Grade/Accessibility (Shrubs, Customer Facilities, Fill/Excavation)
- Numbering
- Voids/Gaps
- Signage Location Number, Warning Sign
- Pad/Vault Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
  - ✓ Elbows
  - ✓ Arrestors
  - ✓ Feed-Through
  - ✓ Cable Condition
  - ✓ Secondary Connections
- Primary Pedestals
  - ✓ Elbows
  - ✓ Junction Condition
  - ✓ Grounding/Bonding
- Secondary Pedestals
  - ✓ Secondary Connections
- Switches URD Switchgear
  - ✓ Insulator Condition
  - ✓ Operating Handle Security
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number/Fuse Size & Number

### INFRARED SCAN and RFI CHECK

- Main Three-Phase Feeders (Risers & Switchgear)
- Priority URD Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating

|  |               | Corrected By   |  |   |  |   |   |   |     |   |   |    |          |          |  |
|--|---------------|--|--|---|--|---|---|---|-----|---|---|----|----------|----------|--|
|  |               | Date Item Corrected  |  |   |  |   |   |   |     |   |   |    |          |          |  |
| Sub Circuit_                             | COMMENTS      | Rating Criteria  0) Good Condition  1) Good Condition but aging  2) Non-critical Maintenance Required  3) Priority Maintenance Required  4) Urgent Maintenace Required |  |   |  |   |   |   |     |   |   |    |          |          |  |
| hq                                       | IR / RFI Scan | Priority URD Transformers, Bushings and Tank heating   |  |   |  |   |   |   | _   |   |   |    |          |          |  |
| Inspected by                             | IR/RF         | Main Three Phase Feeders, Risers & Switchgear  |  |   |  |   |   |   |     |   |   |    |          |          |  |
| -<br>Inspe                               |               | Switches, Signage, Insulators, Security,<br>Linkage, Ground, Bonds   |  |   |  |   |   |   |     |   |   |    |          |          |  |
|  | Z             | Secondary Pedestals, Connections   |  |   |  |   |   |   |     |   |   |    |          |          |  |
| 0  | EQUIPMENT     | Primary Pedestals, Elbows, Grounding, Bonds, Junction cond.  |  |   |  |   |   |   |     |   |   |    |          |          |  |
| RM Date                                  | Ē             | Transformers, Leaks, Bushings,<br>Grounding, Bonds, Elbows, Arrestors, Cable<br>cond, Connections  |  |   |  |   |   |   |     |   |   |    |          |          |  |
| FOF                                      |               | Pad / Vault Condition  |  |   |  |   |   |   |     |   |   |    |          |          |  |
| NOI                                      |               | Signage  |  |   |  |   |   |   |     |   |   |    | <u> </u> |          |  |
| PEC.                                     |               | SqsD \ sbioV   |  |   |  | L |   | _ |     | _ |   |    |          | <u> </u> |  |
| ISNI                                     | STRUCTURE     | Митреплд   |  |   |  |   |   |   |     | _ |   | _  |          | <u> </u> |  |
| NOI.                                     | TRUC          | Grade / Accessibility  |  |   |  |   |   |   |     | _ | _ | _  | _        | _        |  |
| IBUT                                     | S             | Security   |  |   |  |   |   |   |     | _ | _ | _  | _        | ļ        |  |
| STR                                      |               | Dainsə / Levəl   |  |   |  |   | _ | _ |     |   | _ | ļ_ | -        | ļ        |  |
| <u> </u>                                 |               | Enclosure Condition  |  | _ |  |   |   |   | igg |   | _ | _  | <u> </u> |          |  |
| UNDERGROUND DISTRIBUTION INSPECTION FORM | MAP ARFA      | EQUIPMENT  |  |   |  |   |   |   |     |   |   |    |          |          |  |

### IX SUBSTATION - MONTHLY INSPECTION GUIDE

### TRANSFORMER MAIN TANK:

- Oil in bushings
- · Bushing and arrestor porcelain
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Oil leaks
  - ✓ Main tank
  - ✓ Sample valves
  - ✓ Radiators
- Radiator bank
  - ✓ warm on top, cool at bottom
- Tank pressure
- Tank oil level
- Temperature gauge
- Cooling fans

### TRANSFORMER LTC or VOLTAGE REGULATORS:

- Tank oil level
- Drag hand positions
- Cabinet light
- Operation count
- Tank pressure
- Cabinet heater
- Cabinet contamination

### TRANSMISSION CIRCUIT BREAKERS:

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Properly labeled
  - ✓ Aligned properly
- Handles grounded
- Emergency trip button
- Air / Oil compressors
- Air / Oil pressure gauge
- Spring operated mechanism
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

# IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

## FEEDER CIRCUIT BREAKERS / RECLOSERS

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- · Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Labeled properly
  - ✓ Aligned properly
  - ✓ Handles grounded
- Emergency trip button
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

### HIGH AND LOW VOLTAGE BUSS WORK:

- Bushing, insulator, arrestor, and support insulators
  - ✓ Chips or cracks
  - ✓ Rust or dirt
- Bird nests
- Potential transformers bushings
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Cable terminators
  - ✓ Leaking fluid
  - ✓ Cracks or chips

### MANUAL SWITCHES:

- Properly labeled
- Ground connections
- Positioning and alignment
- Bushing and support insulators
  - ✓ Cracks or chips
  - ✓ Rust or dirt

### MOTOR OPERATED SWITCHES:

- OPEN/CLOSED indicator
- Properly labeled
- Cabinet heater
- Operations counter

### IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

### CONTROL HOUSE/MISCELLANEOUS:

- Clock displays proper time
- AC/DC load center breakers
- Room temperature
- Rodents
- Panels labeled properly
- Panel lights
- Annunciator panel
- Panel meters
- SCADA system RTU
- SCADA alarms
- Position indicators agree
- Relay target information
- Emergency contact directory & dial tone for phone
- Safety Equipment

### **BATTERY**:

- Liquid levels
- Proper float voltage on charger and battery
- Specific gravity in pilot cell
- Personal Protective Equipment
- Connection corrosion
- Leaking cells
- Dated solution in eyewash station

### YARD AND FENCE:

- Fire extinguisher charged
- Fence ground connections
- Fence secured
- Security and emergency lights
- Site base and grade
- Standing water
- Warning signs

| MONTHLY S                             | UBSTATI | INOI   | NSPE         | ECTIO       | N FORM            |  |
|---------------------------------------|---------|--------|--------------|-------------|-------------------|--|
| NSPECTED BY:                          |         |        |              |             |                   |  |
| DATE:                                 |         |        |              |             |                   |  |
| SUBSTATION:                           |         |        |              |             |                   |  |
|                                       |         |        |              |             |                   |  |
| TRANSFORMER MAIN TANK                 | RATING: | 0 1    | 2            | 3 4         | (Circle One)      |  |
| inspected X                           |         | COMMEN | NTS          |             | DATE<br>CORRECTED | CORRECTED<br>BY                                  |
| Oil in Bushings                       |         |        |              |             |                   |  |
| Bushing and Arrestor                  |         |        |              |             |                   |  |
| Oil Leaks                             |         |        |              |             |                   |  |
| Main Tank                             |         |        |              |             |                   |  |
| Sample Valves                         |         |        |              |             |                   |  |
| Radiators                             |         |        |              |             |                   |  |
| Radiator Bank                         |         |        |              |             |                   |  |
| Tank Pressure                         |         |        |              |             |                   |  |
| Tank Oil Level                        |         |        |              |             |                   |  |
| Temperature Gauge                     |         |        |              |             |                   |  |
| Cooling Fans                          |         |        |              |             |                   |  |
|                                       |         |        |              |             |                   |  |
|                                       |         |        |              |             |                   |  |
|                                       |         |        |              |             |                   |  |
|                                       |         |        |              |             |                   |  |
|                                       |         |        |              | <del></del> |                   |  |
| TRANSFORMER LTC or VOLTAGE REGULATORS | RATING: | 0 1    | 2            | 3 4         | (Circle One)      |  |
| Tank Oil Level                        |         |        | <del></del>  |             |                   |  |
| Drag Hand Positions                   |         |        |              |             |                   |  |
| Cabinet Light                         |         |        |              |             |                   |  |
| Operation Count                       |         |        |              |             | · ·               |  |
| Tank Pressure                         |         |        |              |             |                   |  |
| Cabinet Heater                        |         |        |              |             |                   | <del>                                     </del> |
| Cabinet Contamination                 |         |        |              |             |                   | <del> </del>                                     |
|                                       |         |        |              |             |                   |  |
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|                                       |         |        |              |             |                   | <u> </u>   |

| MONTHLY SU   | BS  | STATION IN                            | SPE         | CT       | 101                                    | N FORM            |                 |
|--|-----|---------------------------------------|-------------|----------|--|-------------------|-----------------|
| INSPECTED BY:                                      |     | · · · · · · · · · · · · · · · · · · · |             |          |  |                   | - 18            |
| DATE:  |     | · · · · · · · · · · · · · · · · · · · |             |          |  |                   |                 |
| SUBSTATION:  |     |                                       |             |          |  |                   |                 |
|  |     |                                       |             |          |  |                   |                 |
| HIGH VOLTAGE CIRCUIT BREAKER /<br>CIRCUIT SWITCHER |     | RATING: 0 1                           | 2           | 3        | 4                                      | (Circle One)      |                 |
| inspected  | x   | СОММ                                  | ENTS        |          |  | DATE<br>CORRECTED | CORRECTED<br>BY |
| OPEN/CLOSED Indicator                              |     |                                       |             |          |  |                   |                 |
| CHARGED/DISCHARGED Indicator                       |     |                                       |             |          |  |                   |                 |
| Cabinet Light                                      |     |                                       |             |          |  |                   |                 |
| Cabinet Heater                                     |     |                                       |             |          |  |                   |                 |
| Operations Counter                                 |     |                                       |             |          |  |                   |                 |
| Bushings and Supports                              |     |                                       |             |          |  |                   |                 |
| Line and Load Side Disconnect Switches             |     | · · · · · · · · · · · · · · · · · · · |             |          |  |                   |                 |
| Handles Grounded                                   |     |                                       |             |          |  |                   |                 |
| Emergency Trip Button                              |     |                                       |             |          |  |                   |                 |
| Air Compressors - Air / Oil                        |     |                                       |             |          |  |                   |                 |
| Air Pressure Gauge - Air / Oil                     |     |                                       |             |          | ······································ |                   |                 |
| Spring Operated Mechanism                          |     |                                       |             |          |  |                   |                 |
| Oil Level Gauge                                    |     |                                       | <del></del> |          |  |                   |                 |
| Tank Oil Leaks                                     |     |                                       |             |          |  |                   |                 |
| Reset Switch                                       |     |                                       |             |          |  |                   |                 |
| Cabinet Contamination                              |     |                                       |             |          |  |                   |                 |
| Vents Clean  | _ _ |                                       |             |          |  |                   |                 |
| Gas Pressures for GCBs                             |     | <del></del>                           |             |          |  |                   |                 |
|  |     |                                       |             | <u>-</u> |  |                   |                 |
|  | _   |                                       |             |          |  |                   |                 |
|  |     |                                       |             |          |  |                   |                 |

| MONTHLY S                              | U            | BSTATIC | <u>NC</u> | IN  | SPI          | EC <sup>-</sup> | ΓΙΟ | N FORM       |                 |
|--|--------------|---------|-----------|-----|--------------|-----------------|-----|--------------|-----------------|
| INSPECTED BY:                          |              |         |           |     | <u></u>      |                 |     |              |                 |
| DATE:                                  |              |         |           |     |              |                 |     |              |                 |
| SUBSTATION:                            |              |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              |                 |
| FEEDER CIRCUIT BREAKER /<br>RECLOSER   |              | RATING: | 0         | 1   | 2            | 3               | 4   | (Circle One) |                 |
|  |              |         | CON       | MEN | ITS          |                 |     | DATE         | CORRECTED<br>BY |
| inspected                              | <u> </u>     |         |           |     |              |                 |     | CONNEGIE     |                 |
| OPEN/CLOSED Indicator                  |              |         |           |     |              | <u> </u>        |     |              |                 |
| CHARGED/DISCHARGED Indicator           |              |         |           |     |              |                 |     |              |                 |
| Cabinet Light                          | -            |         |           |     |              |                 |     | +            |                 |
| Cabinet Heater                         |              |         |           |     |              |                 |     |              |                 |
| Operations Counter                     |              |         |           |     | <del> </del> |                 |     |              |                 |
| Bushings and Supports                  |              |         |           |     |              |                 |     |              |                 |
| Line and Load Side Disconnect Switches |              |         |           |     |              |                 |     |              |                 |
| Emergency Trip Button                  |              |         |           |     |              |                 |     |              |                 |
| Oil Level Gauge                        |              |         |           |     |              |                 |     |              |                 |
| Tank Oil Leaks                         |              |         |           |     |              |                 |     |              |                 |
| Reset Switch                           |              |         |           |     |              |                 |     |              |                 |
| Cabinet Contamination                  |              |         |           |     |              |                 | ·   |              |                 |
| Vents Clean                            |              |         |           |     |              |                 |     |              |                 |
| Gas Pressures for GCBs                 |              |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              |                 |
|  | -            |         |           |     |              |                 |     |              |                 |
|  | <u> </u>     |         |           |     |              |                 |     |              |                 |
|  | ļ            |         |           |     |              |                 |     |              | 1               |
|  | <del> </del> |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              | <u> </u>        |
|  | $\perp$      |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 | _,, |              |                 |
|  |              |         |           |     |              |                 |     |              |                 |
|  |              |         |           |     |              |                 |     |              | <u> </u>        |

| MONTHLY SU                                 | JB: | STATIO  | N  | INS         | SPE           | ECT         | 101 | N FORM            |                 |
|--|-----|---------|----|-------------|---------------|-------------|-----|-------------------|-----------------|
| INSPECTED BY:                              |     |         |    | <del></del> |               |             |     |                   |                 |
| DATE:                                      |     |         |    |             |               |             |     |                   |                 |
| SUBSTATION:                                |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               |             |     |                   |                 |
| HIGH & LOW VOLTAGE BUSS WORK               |     | RATING: | 0  | 1           | 2             | 3           | 4   | (Circle One)      |                 |
| inspected                                  | х   |         | CO | MEN         | NTS           |             |     | DATE<br>CORRECTED | CORRECTED<br>BY |
| Bushing, Insulator, Arrestor, and Supports | T   |         |    |             | · · · · · · · | ······      |     |                   |                 |
| Bird Nests                                 |     |         |    |             |               |             |     |                   |                 |
| Transformer Bushings                       |     |         |    |             |               |             |     |                   |                 |
| Cable Terminators                          |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               |             |     |                   |                 |
| MANUAL SWITCHES                            |     | RATING: | 0  | 1           | 2             | 3           | 4   | (Circle One)      |                 |
| Properly Labeled                           |     | ·       |    |             |               |             |     |                   |                 |
| Ground Connections                         |     |         |    |             |               |             |     |                   |                 |
| Positioning and Alignment                  |     | ······  |    |             |               |             |     |                   |                 |
| Bushings and Supports                      |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               |             | ·   |                   |                 |
|  | _   |         |    |             |               |             |     |                   |                 |
|  |     |         |    |             |               | <del></del> |     |                   |                 |
| MOTOR OPERATED SWITCHES                    |     | RATING: | 0  | 1           | 2             | 3           | 4   | (Circle One)      |                 |
| OPEN/CLOSED Indicator                      |     |         |    |             |               |             |     |                   |                 |
| Proper Labeling                            |     |         |    |             |               |             |     |                   |                 |
| Cabinet Heater                             |     |         |    |             |               |             |     |                   |                 |
| Operations Counter                         |     |         |    |             |               |             |     |                   |                 |
| locking criteria                           |     |         |    |             |               |             |     |                   |                 |
|  |     |         |    | ·           |               |             |     |                   |                 |
|  |     |         |    |             |               |             |     |                   | :               |

| MONTHLY SU                                | BSTATI  | ONI        | NSP         | EC | TIO        | N FORM            |                 |
|---|---------|------------|-------------|----|------------|-------------------|-----------------|
| NSPECTED BY:                              |         |            |             |    |            |                   |                 |
| DATE:                                     |         |            |             |    |            |                   |                 |
| SUBSTATION:                               |         |            |             |    |            |                   |                 |
|   |         |            |             |    |            |                   |                 |
| CONTROL HOUSE/MISCELLANEOUS               | RATING: | 0 1        | 2           | 3  | 4          | (Circle One)      |                 |
| inspected X                               |         | COMM       | ENTS        |    |            | DATE<br>CORRECTED | CORRECTED<br>BY |
| Clock Displays Proper Time                |         |            |             |    |            |                   |                 |
| AC/DC Load Center Breakers                |         |            |             |    |            |                   |                 |
| Room Temperature                          |         |            |             |    |            |                   |                 |
| Rodents                                   |         |            |             |    |            |                   | <u> </u>        |
| Panels Labeled Properly                   |         |            |             |    |            |                   |                 |
| Panel Lights                              |         |            |             |    |            |                   |                 |
| Annunciator Panel                         |         |            |             |    |            |                   |                 |
| Panel Meters                              |         |            |             |    |            |                   |                 |
| SCADA System RTU                          |         |            |             |    |            |                   |                 |
| SCADA Alarms                              |         |            |             |    |            |                   |                 |
| Position Indicators Agree                 |         |            |             |    |            |                   |                 |
| Relay Target Information                  |         | , <u> </u> |             |    |            |                   |                 |
| Emergency Contact Directory &             |         |            |             |    |            |                   |                 |
| Dialtone for Phone                        |         |            |             |    |            |                   |                 |
| Safety Equipment                          |         |            |             |    |            | (Cirolo Cro)      |                 |
| BATTERY                                   | RATING: | 0          | 1 2         | 3  | 4          | (Circle One)      | T               |
| Liquid Levels                             |         |            |             |    |            |                   |                 |
| Proper Float Voltage on Charger & Battery |         | <u> </u>   |             |    |            |                   |                 |
| Specific Gravity in Pilot Cell            |         |            |             |    |            |                   |                 |
| Personal Protective Equipment             |         |            |             |    |            |                   |                 |
| Connection Corrosion                      |         |            |             |    |            |                   |                 |
| Leaking Cells                             |         |            |             |    |            |                   |                 |
| Dated Solution in Eyewash Station         |         |            |             |    |            |                   |                 |
|   |         |            | <del></del> |    | <u>-</u> . |                   |                 |
| YARD & FENCE                              | RATING  | : 0        | 1 2         | 3  | 4          | (Circle One)      |                 |
| Fire Extinguisher Charged                 |         |            |             |    |            |                   | <del> </del>    |
| Fence Ground Connections                  |         |            |             |    |            |                   |                 |
| Fence Secured                             |         |            |             |    |            |                   |                 |
| Security and Emergency Lights             |         |            |             |    |            |                   |                 |
| Site Base and Grade                       |         |            |             |    |            |                   | <del></del>     |
| Standing Water                            |         |            |             |    |            |                   |                 |
| Morning Signs                             |         |            |             |    |            |                   |                 |

## X Substation - Annual Inspection Guide

- Check equipment for level
- Check condition of concrete pads
- Perform oil and DGA analysis
- Battery
  - ✓ Intercell strap resistance
  - ✓ Individual cell voltages
  - ✓ Cell specific gravity
- Nameplate legible
- Equipment paint condition
- Proper equipment ID labels
- IR / RFI scans and checks

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# ANNUAL SUBSTATION INSPECTION FORM

| VANCE       | Corrected By   |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
|-------------|--|---|--|--|--|--|---|--|--|--|--|--|--|--|--|---|--|--|
| MAINTER     | Date Item Corrected  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| COMMENTS    | Rating Criteria  0) Good Condition  1) Good Condition but aging  2) Non-critical Maintenance Required  3) Priority Maintenance Required  4) Urgent Maintenace Required |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
|             | IK / KFI scans and checks  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   | = V  |  |
| A           | Proper identification labels   |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| RITERI      | Equipment paint condition  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| ION C       | əldigəl ətsiqəmsM  |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| ION INSPECT | Battery checks - Intercell strap<br>resistance, Individual cell voltages,<br>Cell specific gravity   |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| BSTAT       | Perform oil and DGA analysis   |   |  |  |  |  |   |  |  |  |  |  |  |  |  |   |  |  |
| าร          | Check condition of concrete pads   |   |  |  |  |  |   |  |  |  | ļ  | _  | _  |  |  |   |  |  |
|             | Check equipment for level  |   |  |  |  |  |   |  |  |  |  |  |  |  | _  |   | 7.3  |  |
|             | EQUIPMENT LISTING  | ransformer  | TC or regulators   | igh Voltage Breaker  | 0  | eeder CBs / Reclosers  |   |  |  |  | witches  |  |  |  |  | Control house battery   | ransmission line RFI   |  |
|             | SUBSTATION INSPECTION CRITERIA COMMENTS MAINTENANCE COMPLETED  | Check equipment for level Check condition of concrete pads Perform oil and DGA analysis Battery checks - Intercell strap Perform oil and DGA analysis Battery checks - Intercell strap Cell specific gravity Cell specific gravity Cell specific gravity Droper identification labels Cell specific gravity Aameplate legible Equipment paint condition Droper identification labels Battery checks - Intercell strap Cell specific gravity Cell specific gravity Aameplate Required Droper identification but aging Proper identification but aging | SUBSTATION INSPECTION CRITERIA  SUBSTATION INSPECTION CRITERIA  Check condition of concrete pads  Perform oil and DGA analysis  Check condition of checks  Battery checks - Intercell strap  Perform oil and DGA analysis  Check condition of checks  Check condition labels  Resistance, Individual call specific gravity  Check condition but aging  Check condition but aging  Resistance, Individual call specific gravity  Resistance | SUBSTATION INSPECTION CRITERIA  Check condition of concrete pads Perform oil and DGA analysis Perform oil and DGA analysis Battery checks - Intercell strap Perform oil and DGA analysis  Battery checks - Intercell strap Cell specific gravity Nameplate legible Equipment paint condition Nameplate legible Broper identification labels Nameplate legible Broper identification but aging | SUBSTATION INSPECTION CRITERIA  Check condition of concrete pads  Perform oil and DGA analysis  Rating Criteria  Battery checks - Intercell strap  Resistance, Individual cell voltages,  Cell specific gravity  Mameplate legible  Cell specific gravity  Mameplate legible  Equipment paint condition but aging  Proper identification labels  Broper identification but aging  Proper identification but aging  R / RFI scans and checks  Bright Maintenance Required  1) Urgent Maintenance Required | SUBSTATION INSPECTION CRITERIA  LISTING  Check equipment for level  Check condition of concrete pads  Check condition of concrete pads  Check condition of concrete pads  Perform oil and DGA analysis  Check condition of condition  Check equipment paint condition  C | STING  Check equipment for level  Check condition of concrete pads  Check condition of condition  Check condition labels  Battery checks - Intercell strap  Check condition labels  Battery checks - Intercell strap  Cell specific gravity  Cell specific gravity  Cell specific gravity  Proper identification labels  Cell specific gravity  Rating Criteria  Check condition  Droper identification labels  Rating Criteria  Dayloges,  Dayloges,  Check equipment paint condition  Droper identification labels  Cell specific gravity  Proper identification labels  Cell specific gravity  Droper identification labels  Cell specific gravity  Droper identification labels  Proper identification labels  Cell specific gravity  Droper identification labels  Droper identification labels  Cell specific gravity  Droper identification labels  Droper | STING  SUBSTATION INSPECTION CRITERIA  STING  Check condition of concrete pads  Check condition  Battery checks - Intercell strap  Perform oil and DGA analysis  Check condition  Battery checks - Intercell strap  Check condition  Battery checks - Intercell strap  Check equipment paint condition  Check condition  Battery checks  Check analysis  Battery checks - Intercell strap  Check equipment paint condition  Check equipment paint condition  Battery checks  Check analysis  Battery checks - Intercell strap  Check analysis  Battery checks - Intercell strap  Check analysis  Battery checks - Intercell strap  Check condition  Check condition  Battery checks - Intercell strap  Battery checks - Intercell strap  Check analysis  Battery checks - Intercell strap  Battery checks - Intercel | STING  Check equipment for level  Check condition of concrete pads  Perform oil and DGA analysis  Check condition of concrete pads  Perform oil and DGA analysis  Rating Criteria  Battery checks - Intercell strap  resistance, Individual cell voltages,  Cell specific gravity  Mameplate legible  Equipment paint condition  Droper identification labels  Cell specific gravity  Mameplate legible  Equipment paint condition  Proper identification labels  Rating Criteria  Mameplate legible  Cell specific gravity  Mameplate legible  Proper identification but aging  Proper identification but aging  Proper identification Maintenance Required  Proper identification Maintenance Required  Proper identification Maintenance Required  Proper identification Maintenance Required | STING  Check equipment for level  Check condition of concrete pads  Battery checks - Intercell strap  Check condition of condition  Derform oil and DGA analysis  Check condition of condition  Check condition of condition  Derform oil and DGA analysis  Check condition of condition  Check condition of condition  Derform oil and DGA analysis  Check condition of condition  Derform oil and DGA analysis  Check condition of condition  Derform oil and DGA analysis  Check condition  Derform oil and DGA analysis  Derform oil and DGA analysis  Check condition  Deform oil and DGA analysis  Deform oil and DGA analysis  Deform oil and DGA analysis  Check condition  Deform oil and DGA analysis  Deform oil and DGA analysis  Check condition  Deform oil and DGA analysis  Check condition  Deform oil and DGA analysis  Deform oil and DGA analysis  Deform oil analysis  Deform | STING  Check equipment for level  Check equipment for level  Check condition of concrete pads  Battery checks - Intercell strap  Check condition of concrete pads  Battery checks - Intercell strap  Call specific gravity  Animenate Required  Check equired  Check equipment paint condition  Check equipment paint and checks  Condition  Check equipment paint condition  Check equipment pain | SUBSTATION INSPECTION CRITERIA  Check condition of concrete pads  Check condition and DGA analysis  Check condition and DGA analysis  Check condition and checks  Check condition and checks  Cell specific gravity  Cell specific gravity  Cell specific gravity  Cell specific gravity  RAFI scans and checks  Cell specific gravity  RAFI scans and checks  Cell specific gravity  Cell specific gravity  Cell specific gravity  Hamphana Checks  Check condition but aging   Check equipment for level Check condition of concrete pads Check condition of concrete pads Check condition of concrete pads Perform oil and DGA analysis Check - Infercell strap Rating Criteria Nameplate legible Cell specific gravity Vameplate legible Equipment paint condition but aging Droper identification labels Equipment paint condition Nameplate legible Sood Condition but aging Nameplate legible Proper identification labels Nameplate Required Proper Required Nameplate Required | STING  Check equipment for level  Check condition of concrete pads  Check condition of concrete pads  Check condition of concrete pads  Perform oil and DGA analysis  Perform oil and DGA analysis  Resistance, Individual cell voltages,  Cell specific gravity  Cell specific gravity  Cell specific gravity  Nameplate legible  Equipment paint condition  Proper identification labels  Equipment paint condition  IR / RFI scans and checks  Rating  Criteria  Nameplate legible  Proper identification but aging  Criteria  IR / RFI scans and checks  IR / RFI scans Required  Comments   Check equipment for level  Check condition of concrete pads  Check condition of condition  Nameplate legible  Equipment paint condition  Nameplate legible  Conments  RA I RFI scans and checks  Rating Criteria  Nameplate legible  Condition but aging  Proper identification labels  RA I RFI scans and checks  Condition  Nameplate legible  RA I RFI scans and checks  Rating Criteria  Nameplate legible  Congress  Rating Criteria  Nameplate legible  RA I RFI scans and checks  Rating Criteria  Nameplate legible  RA I RFI scans and checks  Rating Criteria  Rating Criteria  Nameplate legible  Rating Criteria  Rating Crite | Check equipment for level  Check condition of concrete pads  Perform oil and DGA analysis  Check condition of concrete pads  Check condition of concrete pads  Battery checks - Intercell atrap  Perform oil and DGA analysis  Check condition of concrete pads  Battery checks - Intercell atrap  Cell specific gravity  Proper identification labels  Battery checks  Cell specific gravity  Proper identification labels  IR / RFI scans and checks  IR / RFI scans and checks  IR / RFI scans and checks  Comments  Check equipment paint condition  Proper identification but aging  Proper identification but aging  RA / RFI scans and checks  Rating Criteria  Mameplate legible  Fequipment paint condition  Proper identification but aging  RA / RFI scans and checks  Rating Criteria  Mameplate legible  Fequipment paint condition  Response and checks  Rating Criteria  Mameplate legible  Response and checks  Response and | Check equipment for level  Check equipment for level  Check condition of concrete pads  Check condition of concrete pads  Check condition of concrete pads  Battery checks - Intercell strap  Check of Condition  Wameplate legible  Equipment paint condition  Wameplate legible  Equipment paint condition  Wameplate legible  Equipment paint condition  Proper identification labels  IR / RFI scans and checks  Comments  Commen | STING  Check equipment for level  Check equipment for level  Check condition of concrete pads  Check condition of concrete pads  Check condition of concrete pads  Perform oil and DGA analysis  Cell specific gravity  Wameplate legible  Equipment paint condition but aging  Cell specific gravity  Wameplate legible  Equipment paint condition but aging  IR / RFI scans and checks  IR / RFI scans and ch |

### XI TRANSMISSION – ANNUAL INSPECTION GUIDE

### **STRUCTURE**

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires

### **EQUIPMENT**

- Switches GOAB, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

# XI TRANSMISSION - ANNUAL INSPECTION GUIDE (con't)

### RFI CHECK

- Splices
- Connectors
- Dead Ends
- Switches
- Structures

# XII TRANSMISSION - 5 YEAR INSPECTION GUIDE

### IR SCAN

- Splices
- Connectors
- Dead Ends
- Switches

# ANNUAL TRANSMISSION INSPECTION FORM

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Date

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|-----------|---|----|---|----|----|-------|----------|----------|-------------|---|-----------------|-------|---|----|---|--|----|
|           | Corrected   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Date Item   | T  |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| COMMENTS  | Rating Criteria  10) Good Condition 11) Good Condition 21) Non-critical Maintenance Required 31) Priority Maintenance Required 41) Urgent Maintenace Required |    |   |    |    |       |          |          |             |   |                 |       |   |    |   | The second secon |    |
|           | conoscolO noitocinumenoO  | L. |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| CLEARANCE | Streets, Roads, Alleys  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| ARA       | Building Clearances   |    |   |    |    |       |          | <u> </u> |             |   |                 |       |   |    |   |  |    |
| CLE       | Ground Line Clearances  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Tree Trimming   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| EQUIPMENT | Arresters   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| EQUIF     | Switches  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | KEI Check   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Conductor and Ties  |    | - |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Customer Equipment  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Signs, Loc#, Warning  |    |   | ļ  |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| RE        | Guy Bond, Insulator   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| STRUCTURE | Down Guys and Markers   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Grounds Intact, Molding   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| STF       | Pole Steps  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Soil Conditions   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Insulators, DE, Pin   |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Crossarm Condition  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
|           | Pole Condition/Leaning  |    |   |    |    |       |          |          |             |   |                 |       |   |    |   |  |    |
| MAP AREA  | LOCATION  |    |   |    |    |       |          | ,        |             |   |                 |       |   |    |   |  |    |